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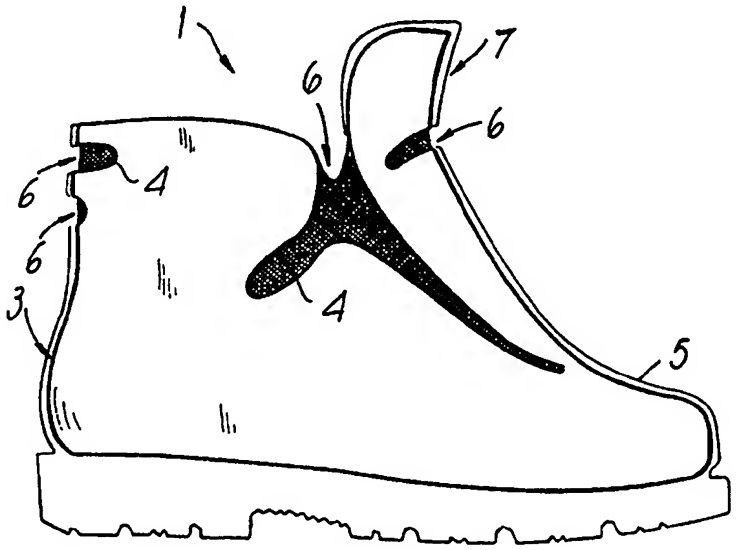

(57) Abstract

A method for manufacturing footwear by injection-molding, including a first step in which at least one sock or one or more portions of sock or of a fabric or of a padding is positioned in one or more molds. This first step is followed by a second step in which one or more operations for partially injection-molding in place thermoplastic material are performed. A shoe (1) is thus obtained which has one or more openings (6) within the layer of thermoplastic material that are closed by the sock or fabric or padding (4). In this way, it is possible to obtain a shoe that features high industrialization and accordingly low production costs ensuring good waterproofing and/or thermal insulation and an innovative aesthetics.

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METHOD FOR MANUFACTURING FOOTWEAR BY INJECTION-MOLDING, AND FOOTWEAR OBTAINED WITH SAID METHOD

Technical Field

The present invention relates to a method for manufacturing footwear by injection-molding and to footwear obtained with said method.

Background Art

Nowadays it is known to manufacture shoes, such as for example ski boots, which usually comprise a shell and at least one quarter, made of plastics, with which soft innerboots are associated to increase the user's comfort.

Equally, it is known to manufacture sports shoes, such as for instance for trekking or climbing, which are usually constituted by a sole with which a shell or upper is associated; a lining or a padding or a sock is inserted or stitched inside the shell or upper.

These known solutions have some drawbacks: first of all assemblying the upper and the lining with basically manual operations, such as stitching, gluing, or welding, entails long production times which consequently lead to high production costs.

Furthermore, the use of plastics makes the shell or upper to be considerably rigid. Accordingly, while on one hand the technical features of the shoe can be improved, on the other hand the user's comfort and foot transpiration are impaired.

Furthermore, the use of stitches makes the shoe permeable to water.

In order to overcome these drawbacks it is known for example to manufacture overlap-style shells for ski boots:

however, this entails another problem linked to the waterproofing of the shell and to the thermal insulation thereof.

Disclosure of the Invention

A principal aim of the present invention is therefore to solve the described technical problems, eliminating the drawbacks of the prior art, by providing a method for obtaining a shoe which has parts manufactured by injection-molding, has a low overall manufacturing cost, and has, at the same time, optimum waterproofing for the user's foot.

Within the scope of the above mentioned aim, an important object is to provide a method which allows to obtain a shoe having optimum thermal insulation and at the same time optimum transpiration for the user's foot.

Another object is to provide a method which allows to improve the industrialization for producing the shoe.

Another object is to provide a method which allows to obtain an aesthetically improved shoe.

The above mentioned aim and objects, as well as others which will become apparent hereinafter, are achieved by a method and by a footwear item as claimed in the appended claims.

Brief Description of the Drawings

Further characteristics and advantages of the invention will become apparent from the following detailed description of some particular but not exclusive embodiments thereof, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

figure 1 is a side view of a shoe shell or upper, for trekking, mountaineering, or cross-country skiing,

manufactured according to the method;

figure 2 is a perspective partial rear view of the shoe of the preceding figure;

figure 3 is a side view of a shoe shell or upper, for trekking, skating, or leisure, according to a further aspect of the invention;

figure 4 is a front perspective view of a shell of an overlap-style ski boot, according to a further aspect of the invention;

figure 5 is a side view, of a shell or upper of a ski boot for mountaineering, snowboarding, or Telemark skiing, according to still a further aspect of the invention;

figure 6 is a sectional view of a particular combination;

figure 7 is a view, similar to the preceding one, of a further combination;

figure 8 is a perspective side view of a shoe shell according to a further aspect of the invention;

figure 9 is a partial side view of a boot according to a further aspect of the invention;

figure 10 is a partial enlarged side view of the boot of the preceding figure in the open position.

Ways of carrying out the Invention

With reference to the figures, the reference numeral 1 generally designates a shoe comprising a sole 2 with which a shell or upper 3 is associated so as to obtain a shoe for trekking, mountaineering, or cross-country skiing.

The method for obtaining this shoe entails, at least regarding the shell or upper 3, a first step in which at least one sock 4 or one or more portions of sock or a piece

of fabric or a padding is positioned at one or more molds.

Specifically, the material for manufacturing the sock can be constituted by natural hide, polyester or mixed-polyester fabric with a membrane known by the trade-name "TEFLON", or fabrics known by the trade-name "GORE-TEX", or materials known by the trade-names "KEVLAR" and "CORDURA", produced by Du Pont.

The material for the sock can also be constituted by a polyurethane or polyamide fabric treated with heat-adhesive films, for example coupled to meshes of polyester or EVA or known by the trade-name PEBAX, the latter being produced by BAYER.

In particular, research has shown that the best composition of the fabric for ensuring optimum cohesion between the sock and the shell or upper 3 is constituted by a sheet 8 of a material that can be of various kinds (polyester, EVA, leather, metal, or others) provided that it has a grid-like structure and can be coextruded with a film 9 of thermoplastic material (polyurethane, polyethylene, nylon, or others) which may have any weight per unit volume, provided that it is compatible with the thermoplastic material which will be subsequently injection-molded in place; advantageously, it is possible to provide, on the opposite side of a grid-like sheet 8, a protective fabric 10 for a thermoplastic film 9, as shown in figure 6.

The method includes a second step in which thermoplastic material is injection-molded in place at least once on one or more regions of said sock 4 or on said one or more portions of sock or fabric or padding, generally designated by the reference numeral 5. Once it has cooled,

the thermoplastic material is suitable to form the shell or upper 3 together with the sock 4 that is coupled thereto.

The use of a material according to the composition shown in figure 6 for the sock or for part thereof allows to achieve optimum anchoring of said sock or sock portion to the shell or upper 3, by virtue of the flow of injected thermoplastic material which occurs through the holes formed in the grid-like sheet 8, during the injection-molding step. Cohesion is thus produced due to melting between this material and the material of the thermoplastic film 9 which lies below the sheet 8, as shown in figure 7, where the molded-in-place thermoplastic material is designated by the reference numeral 11; this cohesion ensures the tight mutual coupling of the two components, namely the sock or portion thereof and the shell or upper.

A shoe is thus obtained which has one or more free regions or openings 6 which affect, in the particular embodiment shown in figures 1 and 2, a rear region above the heel and a region that transversely affects a front tongue 7 and a region where said tongue 7 joins the remaining rigid or semirigid parts that constitute the shell or upper 3.

The thermoplastic material 5 is therefore missing at said one or more regions or openings 6, but said regions or openings are closed by virtue of the underlying sock 4 or portion of sock or fabric or padding.

Therefore, the shoe thus obtained is internally provided with parts made of fabric or with a sock or with a padding having the most appropriate characteristics according to the use for which they are meant and an external structural part which is made of plastics.

The sock 4 can also be obtained by cutting flat materials, such as for example fabric, hide, or extruded materials, subsequently assembled by stitching or welding or weaving by means of circular looms.

The characteristics of said socks or fabric or padding may vary, according to the requirements, as a function of the structure of the fabric or of the material being used: it is thus possible to obtain transpiration, thermal insulation, waterproofing, or the combination of these characteristics if one or more portions of fabric or sock having different characteristics or made of different materials are placed at the mold.

Accordingly, it is thus possible to simultaneously provide optimum heat insulation as well as optimum waterproofing and optimum transpiration at the regions or openings 6.

It has thus been observed that the method and the shoe have achieved the intended aim and objects, since the method allows to obtain a shoe at a lower cost, since it is possible to eliminate manual operations, such as the stitching between the hide or plastic upper and the lining, which considerably increase the production time.

It is also possible to obtain regions or openings 6 that have a desired width or constitute aesthetic elements, as shown in figure 3, where in a shoe, which can be meant for trekking, skating or leisure, the openings 6 form lightening regions and/or regions for transpiration.

The method therefore provides a considerable improvement to the industrialization of the product, leading to a large reduction in production costs since the cycle is

shorter although the shoe thus obtained maintains an excellent quality regarding its technical characteristics.

The structure thus obtained can in fact have optimum waterproofing characteristics at the free regions or openings 6, and can at the same time allow optional transpiration of the shoe; at the same time, the structure can be provided with optimum thermal insulation by interrupting the continuity of the plastics, which is not very comfortable at low temperatures since it is a good heat conductor. This plastics is replaced, for example, with a fabric having better thermal insulation characteristics.

The above-mentioned characteristics can be provided individually or in combination, according to the material or the structure of the fabric being utilized.

Finally, the method allows to obtain footwear which has better quality standards, since the processing steps have been reduced and therefore the likelihood of rejects is lower.

The method and the shoe obtained thereby can of course be susceptible of numerous modifications and variations, all of which are within the scope of the same inventive concept.

Thus, for example, figure 4 illustrates a shell 103 for a ski boot which has a longitudinal recess 106 formed at the region above the metatarsal region and the foot instep.

In the illustrated embodiment, the longitudinal recess 106 is closed by means of the portion of fabric 110 where the plastic material has not been molded in place.

An appropriate padding can be associated with said portion of fabric 110 and can therefore act as a seal against the infiltration of water or snow or, on the inside,

provide adaptation to the anatomical shape of the foot.

As an alternative, as shown in figure 8, said portion of fabric 310 can be associated with an overlap-style shell 303 so as to still constitute an element for mutually connecting the flaps which allows to move them apart or overlap them and at the same time prevents the infiltration of water or snow or, on the inside, provide adaptation to the anatomical shape of the foot.

Figure 5 illustrates a shoe 201, for example for mountaineering or snowboarding or Telemark skiing, which is constituted by a sole 202 with which a shell 203 obtained by injection-molding thermoplastic material 205 is associated; said shell surrounds the rear lateral region of the foot as well as partially the tip of said foot, and free regions 206 are instead formed at the metatarsal and instep regions of the foot; the sock or fabric 204 is visible in these regions 206 and it can have waterproofing and thermal insulation characteristics.

Figures 9, 10 show a ski boot 401 obtained by the method of the invention. The boot 401 includes an upper 415 having a rear flap 416 obtained monolithically. A sock, or fabric 404 is provided inside the upper, as described above.

A lever, or other suitable device, 417, cooperates with a traction member 418 for closing and opening the rear flap 416 as shown in the figures.

A per se known adjuster 418 may be provided at the traction member.

The materials and the dimensions that constitute the individual components of the invention may of course be the most pertinent according to the specific requirements.

CLAIMS

1. Method for manufacturing footwear by injection-molding, characterized in that it comprises a first step in which at least one sock or one or more portions of sock or of a fabric or of a padding is positioned in one or more molds and a second step that comprises one or more operations for injection-molding in place thermoplastic material in one or more regions of said at least one sock or one or more portions of sock or fabric or padding.

2. Method according to claim 1, characterized in that said at least one sock or one or more portions of sock or fabric or padding is made of natural hide, of a polyester or mixed polyester fabric with a membrane known by the trade-name "TEFLON", or fabrics known by the trade-name "GORE-TEX", or materials known by the trade-names "KEVLAR" or "CORDURA" produced by Du Pont.

3. Method according to claim 1, characterized in that said at least one sock or one or more portions of sock or fabric or padding is constituted by a polyurethane or polyamide fabric treated with heat-adhesive films, coupled for example to a mesh of polyester or EVA or known by the trade-name PEBAX.

4. Method according to one or more of the preceding claims, characterized in that said at least one sock or one or more portions of sock or fabric or padding is obtained by cutting flat materials, such as for example fabric, hide or extruded materials, subsequently assembled by means of stitches or welds or by weaving with circular looms.

5. Method according to claim 1, characterized in that

said second step entails one or more moldings in place of thermoplastic material on one or more regions of said at least one sock or one or more portions of sock or fabric or padding, so as to produce a shoe having one or more free regions or openings.

6. Shoe obtained with said method, characterized in that it comprises a shell or an upper or parts thereof which are made of plastic material and have one or more free regions or openings within the layer of thermoplastic material that are closed or affected by part of at least one underlying sock or one or more portions of sock or fabric or padding.

7. Shoe according to claim 6, characterized in that said one or more free regions or openings affect the rear region above the heel and/or a tongue and/or the part that transversely affects said front tongue and/or a region that joins said tongue and the remaining rigid or semirigid parts that constitute said shell or upper and/or a region that is adjacent to the sole.

8. Shoe according to claim 6, characterized in that it comprises a shell for a ski boot or Telemark boot or a skate which has a longitudinal recess formed at the region above the metatarsal and instep regions of the foot, said longitudinal recess being closed by means of said at least one sock or one or more portions of sock or fabric or padding on which the thermoplastic material has not been injection-molded in place in this region.

9. Shoe according to claim 6, characterized in that it comprises a shell for a ski boot or Telemark boot or a skate which has flaps that mutually overlap at the region above

the metatarsal and instep regions of the foot, said flaps being made of thermoplastic material and being mutually connected by said at least one sock or one or more portions of sock or fabric or padding.

10. Shoe according to claim 6, characterized in that it comprises a sole with which a shell formed by injection-molding thermoplastic material is associated, said shell surrounding the rear lateral region of the foot and partially the tip of said foot, free regions being provided at the metatarsal and instep regions of the foot, said at least one sock or one or more portions of sock or fabric or padding being visible in said free regions.

11. Shoe according to one or more of the preceding claims, characterized in that said fabric is constituted by a sheet that has a grid-like structure and is suitable to be coextruded together with a film of thermoplastic material.

12. Shoe according to claim 11, characterized in that a protection fabric is associated with said film of thermoplastic material.

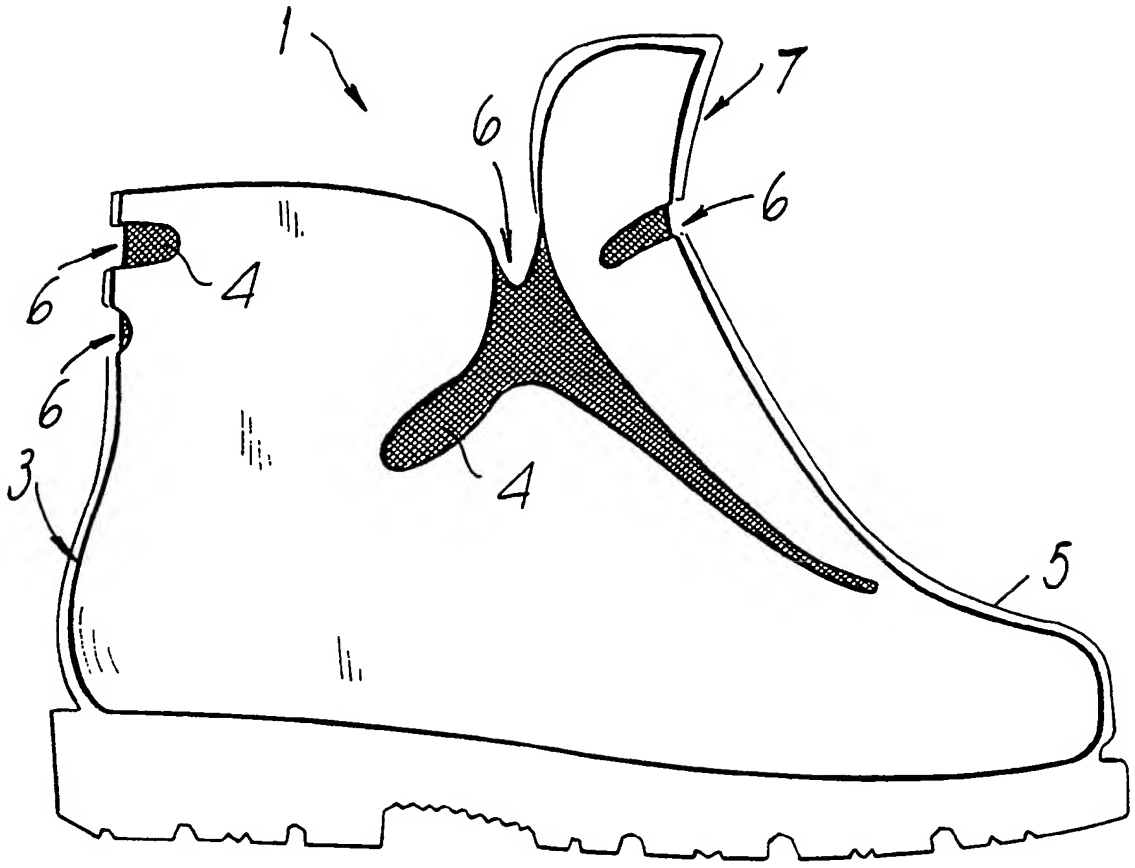

Fig. 1

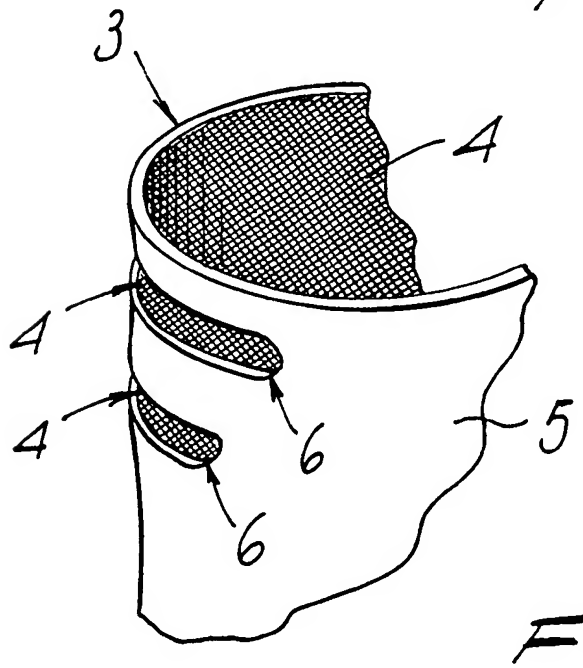

Fig. 2

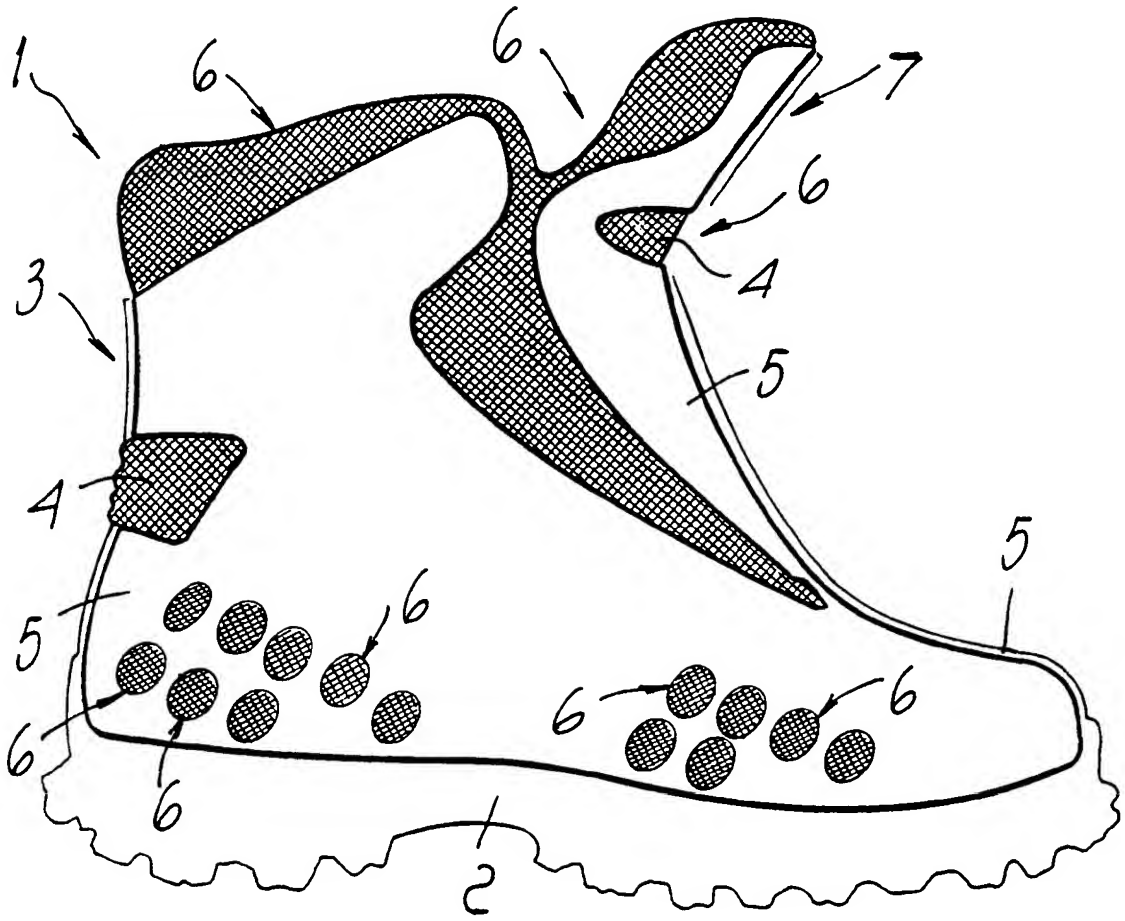

FIG. 3

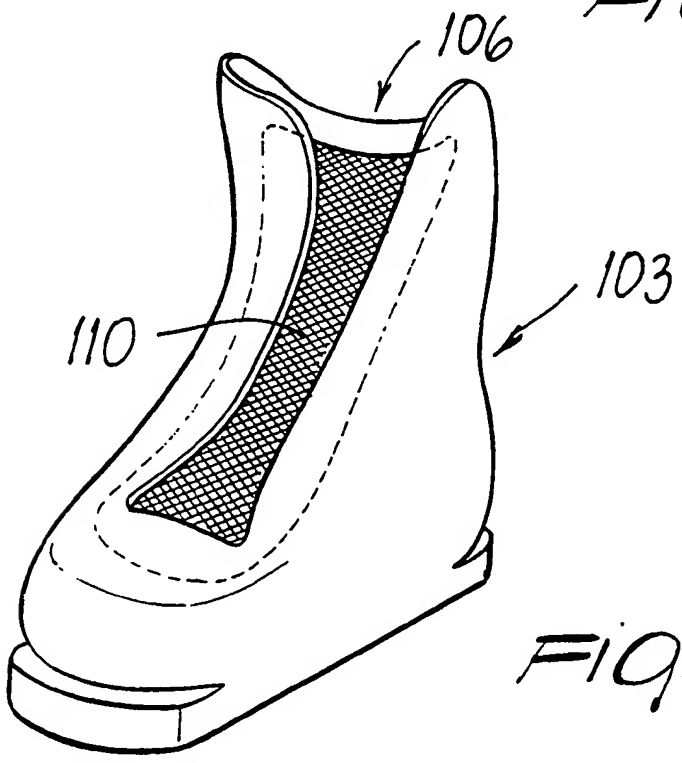

FIG. 4

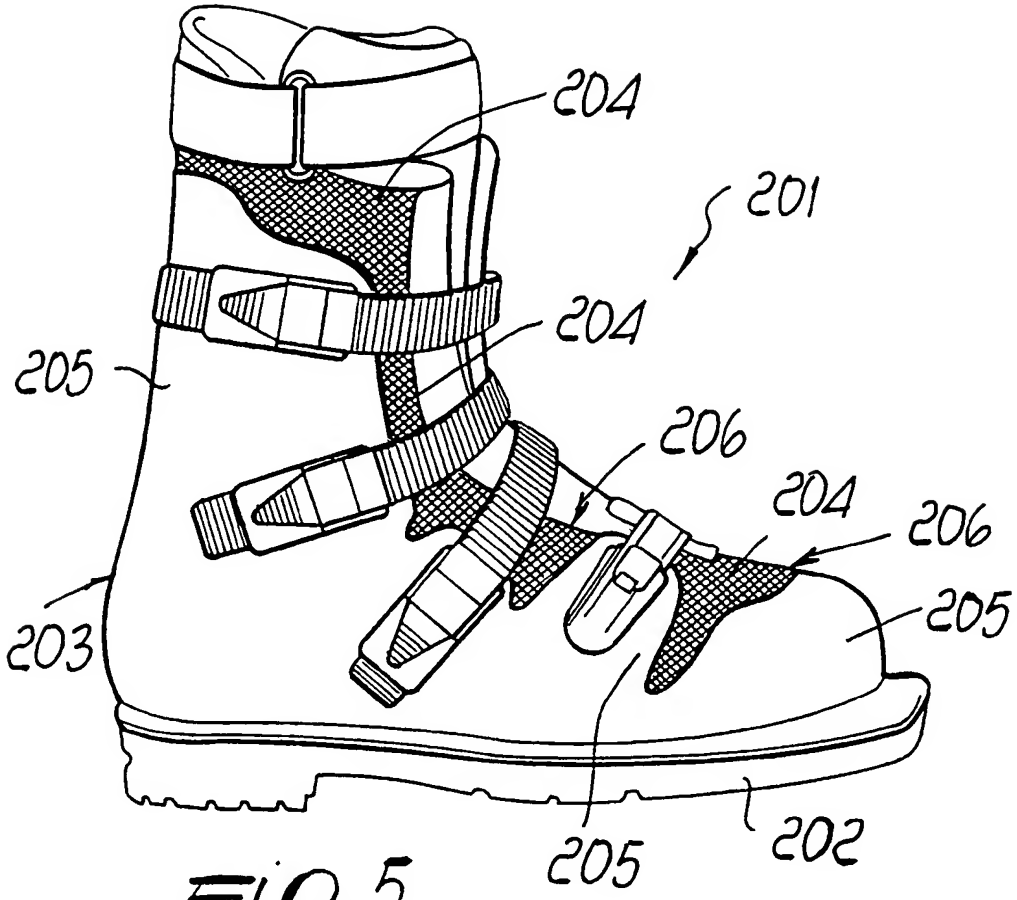

FIG. 5

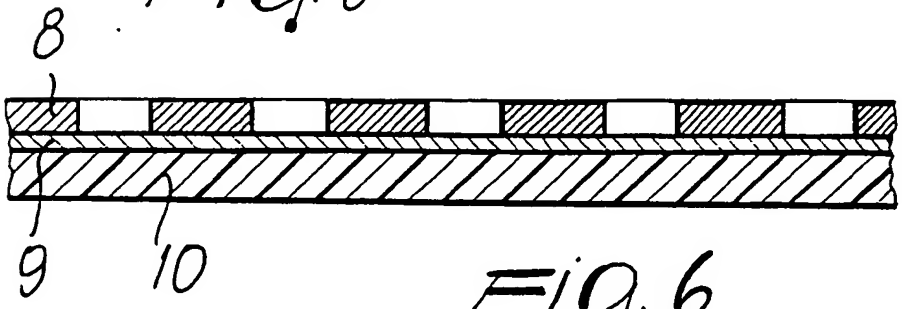

FIG. 6

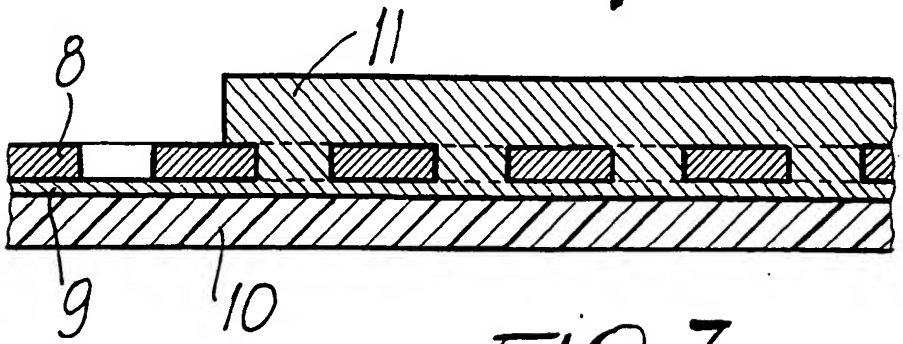

FIG. 7

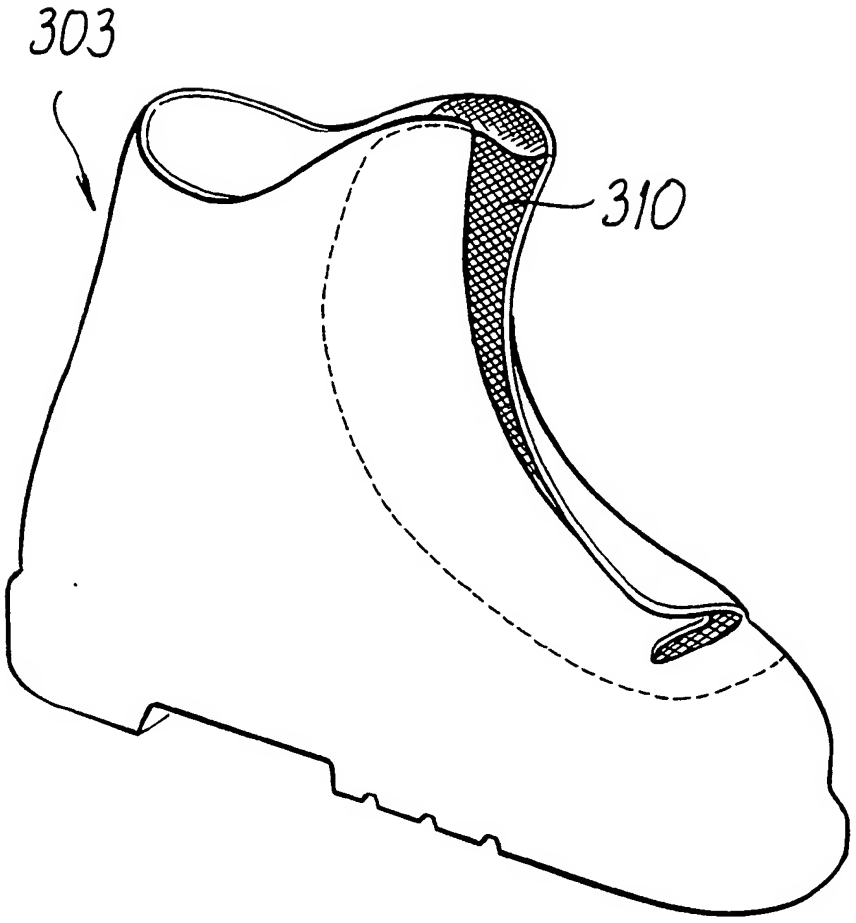

Fig. 8

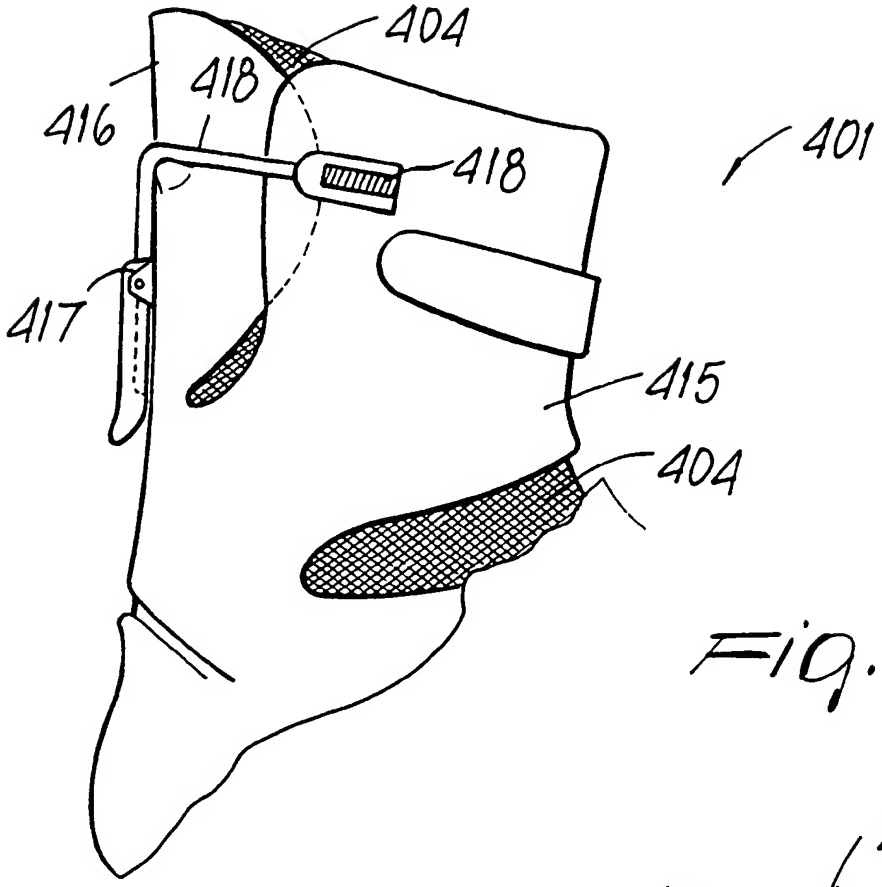

Fig. 9

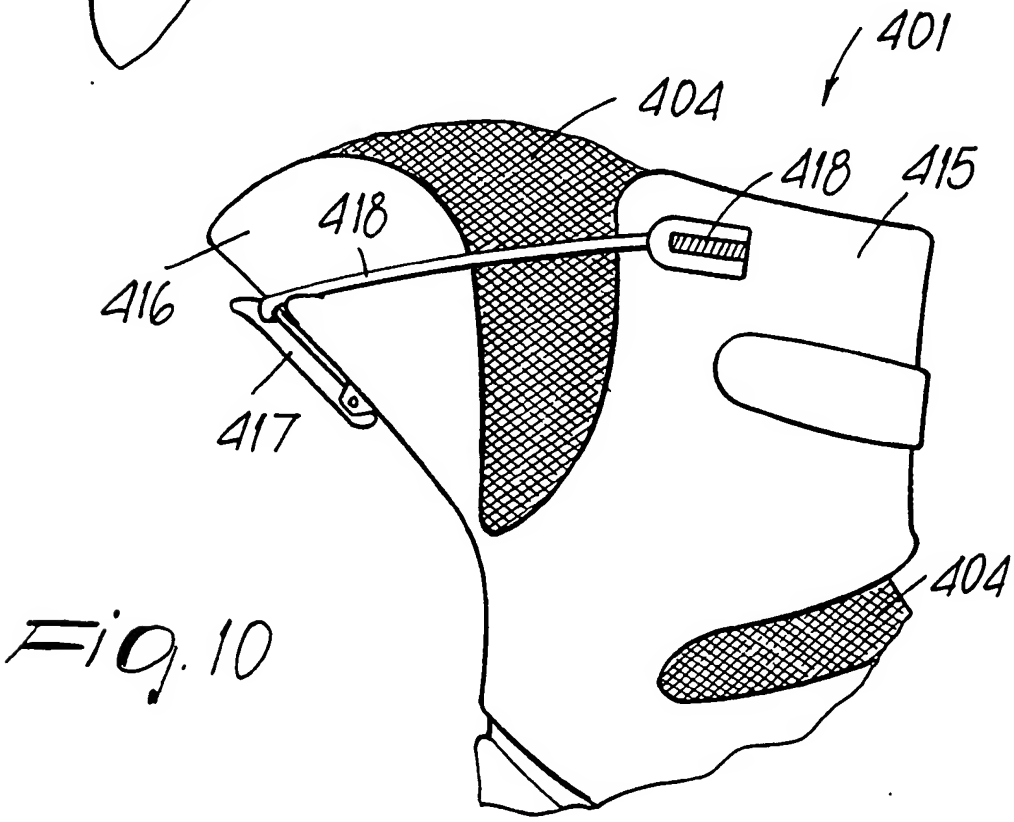

Fig. 10

INTERNATIONAL SEARCH REPORT

Inter nal Application No
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A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 B29D31/50 A43B23/07 A43B23/02

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 B29D A43B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	FR,A,2 484 215 (PIRAUD) 18 December 1981 see the whole document ---	1,5-7 2-4
X	US,A,4 447 967 (ZAINO) 15 May 1984 see the whole document ---	1,4-7
X	DE,U,19 71 924 (RIEKER & CO) 2 November 1967 see the whole document ---	1,5-7
X	FR,A,2 077 184 (ZANATTA) 15 October 1971 see the whole document ---	1,5-7
Y	WO,A,92 06608 (CALDWELL) 30 April 1992 see the whole document ---	2-4
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Date of the actual completion of the international search	Date of mailing of the international search report
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